

**ABSTRACT**

The present invention is an I<sup>2</sup>C (inter-IC control) bridge device which implements a communication protocol layered on top of a standard I<sup>2</sup>C protocol. The layered protocol used by the bridge device is termed the "Layered I<sup>2</sup>C Protocol" - abbreviated "LIP". Thus the bridge device is called a "LIP bridge device". The LIP bridge device provides I<sup>2</sup>C address extension, data integrity checking, and fault detection and isolation when inserted between an I<sup>2</sup>C bus master and it's intended target I<sup>2</sup>C device. Each LIP bridge device has at least two attached I<sup>2</sup>C busses – a parent bus and a child bus. The LIP bridge operates as a slave on its parent bus, and a master of its child bus. The Layered I<sup>2</sup>C protocol is specified to operate on a bus between one or more bus masters and the parent bus of one or more LIP bridge devices. The child bus is used for attaching multiple I<sup>2</sup>C devices and/or one or more LIP bridge devices. In an exemplary implementation, the LIP bridge device is constructed using a microcontroller to create a LIP bridge device with one parent and one child I<sup>2</sup>C bus port and a group of LIP bridge configuration pins. The parent bus traffic to a given LIP bridge device consists entirely of LIP packets, and the child bus traffic consists of standard I<sup>2</sup>C packets to communicate with standard child bus I<sup>2</sup>C devices. The child bus traffic may also consist of LIP packets to communicate with LIP bridges attached to the child bus. By design, the LIP packets and standard I<sup>2</sup>C transactions do not interfere with one another. The LIP bridge device interprets LIP command packets from a bus master and translates them into the intended I<sup>2</sup>C data stream that is then broadcast over the child bus. Likewise, data from the child bus is used to create LIP packets that are returned to the proper bus master. The use of LIP packets on a given I<sup>2</sup>C bus provides an extra level of I<sup>2</sup>C addressing.